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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/525,926
Filing Date: February 25, 2005
Appellant(s): BIESTER, KLAUS

Collin A. Rose
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 9, 2008 appealing from the Office action mailed January 9, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

3,481,215	HOWELL	12-1969
5,370,011	GILGES et al.	12-1994

5,722,304	ALLEN	3-1998
5,743,348	COPPOLA et al.	4-1998
6,095,487	WABER	8-2000
6,585,246	MCCORMICK et al.	7-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-7, 11, 13-15, 17-23 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCormick et al. (6,585,246) in view of Howell (3,481,215).

Regarding claims 1, McCormick et al. disclose a regulating device having a ball spindle drive (ball nut 22 rotates a screw 24) with the ball nut being rotated by motor (14) through a first gear (18) connected to a ball nut assembly and a second gear (16) connected on the end of the motor drive shaft (17). McCormick et al. do not disclose the gears being self-locking, double helical gears. However, Howell teaches the use of self-locking double helical gears on parallel shafts with any desired gear ratio (col. 2, lines 3-6) in order for the drive train to completely prevent overshoot of the output and to provide almost perfect damping characteristics (col. 2, lines 27-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the first and second gear of McCormick et al. as a double helical gear having self-locking characteristics as taught by Howell in order to prevent overshoot of the output and to provide almost perfect damping characteristics. The recitation "for operation of a blowout preventer" is the intended use of a regulating device. It has been held that a recitation with respect to the manner in which a claimed apparatus is

intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

In regards to claim 2, McCormick et al. disclose a ball nut (22) that is allowed to rotate but is constrained from axial movement and the ball nut rotates and linearly translates a screw (24) to move an actuator.

In regards to claim 3, McCormick et al. disclose a rotating screw and actuating element are arranged along a common axis (fig. 1).

In regards to claim 4, the modified McCormick et al. reference discloses the ball nut connected to a first gear (18) while the motor is connected a second gear (16).

In regards to claim 5, McCormick et al. disclose an electric motor (col. 2, lines 25-26).

In regards to claims 6 and 7, the modified McCormick et al. reference discloses an additional second gear (34) that connects to the first gear and is operated by a second motor (32) with each motor having a drive shaft (17, 33) in parallel to the other drive shaft.

In regards to claims 11 and 27, the modified McCormick reference discloses a helical angle between 50° to 90°.

In regards to claim 13, McCormick et al. disclose the housing to be of a module design with the housing being flange-mounted (attached at flange extending from lower portion of housing in Fig. 1).

In regards to claim 14, McCormick et al. disclose the housing having a first module (upper portion of housing containing motors 14, 32 and ball nut 22) and a second module (lower portion of housing having screw 24 and stop collar 46).

In regards to claim 15, McCormick et al. disclose an intermediate cover (plate that gears 16, 34 are set on) that provides single-ended support of the second gears.

In regards to claim 17, McCormick et al. disclose the first gear mounted on the opposite side of the ball nut from the actuating element (Fig. 1).

In regards to claim 18, McCormick et al. disclose an intermediate ring (ball nut hub 20) placed between the ball nut and the first gear.

In regards to claim 19, McCormick et al. disclose bearing (40) to support the ball nut and retention ring (Fig. 1).

In regards to claim 20, McCormick et al. disclose the actuating element (element connected to the end of screw 24 opposite the ball nut) that is supported from rotating.

In regards to claim 21, McCormick et al. disclose the second motor (32) is wired in parallel to the first motor (14) and acts as a slave to provide additional torque (col. 2, lines 52-55).

In regards to claims 22, 25 and 26, the modified McCormick et al. reference discloses the second gear having differing amounts of teeth than the first gear producing a change in gear ratio. The modified McCormick et al. reference does not expressly disclose a ratio of the teeth of the first gear to the teeth of the second gear to be 1 to 10, 1 to 7 or 1 to 4. The prior art recognizes the gear ratio as a results-effective variable, i.e. a variable that achieves a recognized result. In the instant case, the ratio of

the teeth of the first gear to the teeth of the second gear should be adjusted to obtain a desired output on the actuating element from the input of the electric motors. Since the prior art recognizes this as a results-effective variable, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have chosen the gear ratio to be 1 to 10, 1 to 7, or 1 to 4, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (MPEP 2144.05).

In regards to claim 23, McCormick et al. disclose the motors operating together and are coupled to each other through the second and first gears.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over McCormick et al. in view of Howell and further in view of Waber (6,095,487).

McCormick et al. in view of Howell discloses an actuator having a motor operating a second gear that rotates a first gear that rotates a ball nut to turn a screw to operate the actuator. The modified McCormick et al. reference does not disclose the use having at least two motors arranged on each drive shaft. However, Waber teaches the placement of a second motor on a drive shaft to operate a drive shaft for the purpose of compensating for position errors in the drive units (col. 1, lines 18-21). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to place a second motor on the drive shafts of the modified McCormick et al. reference as taught by Waber in order to compensate for position errors in the drive units.

Claims 9-10 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCormick et al. in view of Howell and further in view of Allen (5,722,304).

In regards to claims 9-10 and 24, the modified McCormick et al. reference discloses an actuator having a motor operating a second gear that rotates a first gear that rotates a ball nut to turn a screw to operate the actuator. The modified McCormick et al. reference does not disclose the use of a reduction gear. However, Allen teaches the use of a harmonic drive in a linear actuator because harmonic drives provide a high gear ratio, low backlash, high efficiency, long life and mounting simplicity (col. 3, lines 56-62). Therefore, it would have been obvious to provide the actuator of the modified McCormick et al. reference with the harmonic drive as taught by Allen in order to provide the actuator with a high gear ratio, low backlash, high efficiency and long life.

Claim 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCormick et al. in view of Howell and further in view of Coppola et al. (5,743,348).

In regards to claim 12, the modified McCormick et al. reference discloses an actuator having a motor operating a second gear that rotates a first gear that rotates a ball nut to turn a screw to operate the actuator. The modified McCormick et al. reference does not expressly disclose a transmission ratio between 25 and 1. However, Coppola et al. teach a transmission ratio of approximately 11.46 so that when the motor outputs 12,000 rpm, the speed is reduced to the order of 1,050 rpm in order to slow the rotation of the output shaft for improved control over the electric motor output (col. 5, lines 35-44). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the actuator of the modified McCormick et al.

reference with a transmission ratio of 11.46 as taught by Coppola et al. in order to provide improved control over the output shaft.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over McCormick et al. in view of Howell and further in view of Gilges et al. (5,370,011).

In regards to claim 16, the modified McCormick et al. reference discloses an actuator having a motor operating a second gear that rotates a first gear that rotates a ball nut to turn a screw to operate the actuator. The modified McCormick et al. reference does not disclose the placement of a position sensor in the housing. However, Gilges et al. teach the placement of a position sensor through an intermediate cover for the purpose of measuring the position of a control element and transmit a signal to the control system to adjust the position of the control element. Therefore, it would have been obvious to one of ordinary skill in the art at the time-the invention was made to place a sensor through an intermediate cover to measure the position of the rotating member of the modified McCormick et al. reference as taught by Gilges et al. in order to provide feedback and position control for the actuating element and rotating member.

(10) Response to Argument

<u>Regarding the 103 rejection of claims 1-7, 11, 13-15, 17-23 and 25-27 as being obvious over McCormick et al. in view of Howell</u>

Appellant argues the combination of McCormick et al. and Howell stating that the suggested modification to be “over-engineering”. The examiner disagrees. Appellant argues that the device of the McCormick reference would not experience any issues with servomechanism overshoot or imperfect damping characteristics. However, the

screw (24) of the McCormick et al. reference is prevented from non-powered motion by the motors. The application of additional outside force to screw (24) provides undue stress to motors which could result in failure of the motors. Therefore, the use of self-locking double helical gearing as taught by the Howell reference provides for almost perfect damping characteristics which would prevent the motors from receiving undue stress.

Alternatively, the replacement of the gearing of the McCormick et al. reference with the self-locking double helical gearing as taught by the Howell reference could be seen as replacing the need for an additional brake (37 of the McCormick et al. reference) which would provide the damping and self-locking characteristics to the regulating device of the McCormick et al. reference regardless of its intended use and would further reduce the number of components and complexity.

Appellant further argues the combination of McCormick et al. and Howell stating that the references are non-analogous art. The examiner disagrees. Appellant states that the McCormick et al. reference and the Howell reference are not reasonably pertinent to the problem of blowout preventer actuation. However, the blowout preventer and actuation of the blowout preventer is not positively recited in the claims. The McCormick et al. reference discloses a regulating device that provides for the linear regulation of a moving shaft (screw 24) wherein the operation of the regulating device requires the use of gearing to transmit a rotational force from the motors to a linear motion of a shaft. The Howell reference teaches the use of self-locking double helical gearing to transmit the rotational force of one shaft and one gearing to a second

gearing. Therefore, the McCormick et al. reference and the Howell reference are analogous to art of regulating devices in which a rotating gear interacts with another rotating gear.

Regarding the 103 rejection of claim 8 as being obvious over McCormick et al. in view of Howell and further in view of Waber

Appellant argues the limitations as discussed with independent claim 1. The limitation of providing at least two motors on each drive shaft is referenced in claim 8. Waber teaches the use of two motors on a single drive shaft as shown in figure 1.

Regarding the 103 rejection of claims 9-10 and 24 as being obvious over McCormick et al. in view of Howell and further in view of Allen

Appellant argues the limitations as discussed with independent claim 1. The limitations of using a reduction gear, or harmonic drive, in the drive train are referenced in claims 9-10 and 24. Allen teaches the use of a harmonic drive in a linear actuator to provide a high gear ratio, low backlash, high efficiency, long life and mounting simplicity (col. 3, lines 56-62).

Regarding the 103 rejection of claim 12 as being obvious over McCormick et al. in view of Howell and further in view of Coppola et al.

Appellant argues the limitations as discussed with independent claim 1. The limitations of using a gear ratio lower than 25 are referenced in claim 12. Coppola et al. teach a transmission ratio of approximately 11.46 so that when the motor outputs 12,000 rpm, the speed is reduced to the order of 1,050 rpm in order to slow the rotation

of the output shaft for improved control over the electric motor output (col. 5, lines 35-44).

Regarding the 103 rejection of claim 16 as being obvious McCormick et al. in view of Howell and further in view of Gilges et al.

Appellant argues the limitations as discussed with independent claim 1. The limitations of using a position sensor arranged on an intermediate cover are referenced in claim 16. Gilges et al. teach the placement of a position sensor through an intermediate cover for the purpose of measuring the position of a control element and transmit a signal to the control system to adjust the position of the control element.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Andrew Rost

/A. J. R./

Examiner, Art Unit 3753

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